

CLAIMS

1. A fluid connector for conveying fluid between a fluid container and a catheter, comprising:

first and second housings each defining an interior and having a proximal and a distal opening, said housings being adapted to fluidly connect to one another at their proximal openings, wherein one of the first and second housing distal openings is configured to be fluidly coupled to the container and the other of said distal openings is adapted to be fluidly coupled to the catheter;

a penetration tube mounted within said first housing, the penetration tube having closed and open ends and a radial surface with at least one fluid opening, said open end being fluidly coupled to the first housing distal opening and said closed end being disposed within said first housing proximal opening when the first and second housings are not connected together;

a first stopple formed from an elastic material, said first stopple mounted in the proximal opening of the first housing, said first stopple having an opening that conforms about the closed end of the penetration tube when the housings are not connected together to fluidly seal said first housing proximal opening;

a second stopple formed from an elastic material, said second stopple mounted in the proximal opening of the second housing, said second stopple having a normally-closed opening configured to receive the closed end of the penetration tube when the housings are being connected to each other, the first and second stopples having exterior facing surfaces that abut one another when the housings are connected together causing the penetration tube, led by its closed end, to penetrate through the second stopple opening into the second housing when the first and second housings are connected together, wherein the penetration tube penetrates deep

enough into the second connector housing so that the at least one opening of the penetration tube's radial surface is contained within the second connector housing beyond the second stopple for conveying fluid within the second housing; and

said first and second housings having at least one set of cooperatively interlocking detents for securing said first and second housings together when connected, wherein said at least one set of detents release to de-couple the first and second housings when a sufficient force is exerted to pull said housings away from one another.

2. The connector of claim 1, wherein the penetration tube tapers toward its closed end.
3. The connector of claim 1, wherein the first and second housings are generally cylindrically shaped.
4. The connector of claim 1, wherein at least one radial surface opening comprises a slit opening.
5. The connector of claim 1, wherein the first stopple comprises a spool-shaped cylinder having a cylinder axis, the stopple compressing along said cylinder axis when the housings are connected together thereby exposing the proximal end of the penetration tube and allowing it to enter the second housing.
6. The connector of claim 1, wherein the first housing distal opening is adapted to be coupled to the fluid container.
7. The connector of claim 6, wherein the second housing distal opening is adapted to be directly coupled to the catheter.
8. The connector of claim 6, wherein the second housing distal opening is adapted to be coupled to the catheter through flexible tubing.

9. The connector of claim 1, further comprising a lever release mechanism operably linked to at least one set of cooperatively interlocking detents to release said detents in response to a release force exerted by a user.

10. The connector of claim 1, wherein said at least one set of cooperatively interlocking detents, when engaged, are disposed away from the exterior faces of said first and second stopples so that contamination from locking and interlocking of the detents is limited.

11. The connector of claim 1, wherein the at least one radial opening is disposed sufficiently beyond the second stopple exterior surface within the second housing when the first and second housings are connected to convey fluid substantially without leaking said fluid between the abutted first and second stopple surfaces.

12. The connector of claim 1, wherein the closed proximal end of the penetration tube defines a plug that is disposed in the proximal opening of the first housing with the first stopple conformed about it when the first and second housings are not connected to each other.

13. The connector of claim 12, wherein said plug has a leading blunt surface that initially engages the second stopple when the first and second housings are being connected together.

14. The connector of claim 1, wherein the first stopple opening is a formed hole in the elastic material.

15. An IV system comprising the fluid connector recited in claim 1.

16. A fluid connector, comprising:

first and second housings each having a proximal and a distal opening, said housings being adapted to fluidly connect to one another at their proximal openings;

a penetration tube mounted within said first housing, the penetration tube having open and closed ends and a radial surface with at least one fluid opening, said open end being fluidly

coupled to the first housing distal opening and said closed end being disposed within said first housing proximal opening when the first and second housings are not connected together;

a first stopple mounted in the proximal opening of the first housing, said first stopple having an opening conforming about the penetration tube closed end to fluidly seal the proximal opening of the first housing when the housings are not connected to each other; and

a second stopple mounted in the proximal opening of the second housing, said second stopple having a normally-closed opening configured to receive the penetration tube closed end when the housings are being connected to each other, the first and second stopples having exterior facing surfaces that abut one another when the housings are connected together causing the penetration tube, led by its closed end, to penetrate through the second stopple opening into the second housing when the first and second housings are connected together, wherein the penetration tube penetrates deep enough into the second connector housing so that the at least one opening of the penetration tube's radial surface is contained within the second connector housing beyond the second stopple for conveying fluid within the second housing substantially without leakage between the abutted stopple surfaces.

17. The connector of claim 16, further comprising at least one set of cooperatively interlocking break-away detents for securing said first and second housings together when connected, wherein said at least one set of detents release to de-couple the first and second housings when a sufficient force is exerted to pull said housings away from one another.

18. The connector of claim 17, further comprising a lever mechanism operably linked to the at least one set of cooperatively interlocking detents to release said detents in response to a release force exerted by a user.

19. The connector of claim 16, wherein the first and second housings are generally cylindrically shaped.

20. The connector of claim 16, wherein the at least one radial surface opening comprises a slit opening.

21. The connector of claim 16, wherein the first stopple comprises a spool-shaped cylinder having a cylinder axis, the stopple compressing along said cylinder axis when the housings are connected together thereby exposing the proximal end of the penetration tube and allowing it to enter the second housing.

22. The connector of claim 16, wherein the first housing distal opening is adapted to be coupled to a fluid container.

23. The connector of claim 22, wherein the second housing distal opening is adapted to be directly coupled to the catheter.

24. The connector of claim 22, wherein the second housing distal opening is adapted to be coupled to the catheter through flexible tubing.

25. The connector of claim 16, wherein said at least one set of cooperatively interlocking detents, when engaged, are disposed away from the exterior faces of said first and second stopples so that contamination from locking and interlocking of the detents is limited.

26. A fluid connector, comprising:
first and second housings each having a proximal and a distal opening, said housings being adapted to fluidly connect to one another at their proximal openings, wherein the first and second housings have at least one set of cooperatively interlocking break-away detents for securing said first and second housings together when connected, said at least one set of detents

releasing to de-couple the first and second housings when a sufficient force is exerted to pull said housings away from one another;

a penetration tube mounted within said first housing, the penetration tube having distal and proximal ends, said distal end being fluidly coupled to the first housing distal opening, and said penetration tube being suitable for fluidly engaging the second housing when the first and second housings are connected together;

a first stopple mounted in the proximal opening of the first housing to fluidly seal the proximal opening of the first housing when the housings are not connected to each other, the first stopple having a normally closed opening for receiving and passing the proximal end of the penetration tube for entry into the second housing when the first and second housings are connected together;

a second stopple mounted in the proximal opening of the second housing, said second stopple having a normally-closed opening configured to receive the penetration tube proximal end when the housings are being connected to each other, the first and second stopples having exterior facing surfaces that abut one another when the housings are connected together causing the penetration tube, led by its proximal end, to penetrate through the second stopple opening into the second housing when the first and second housings are connected together; and

a lever mechanism operably linked to the at least one set of cooperatively interlocking detents to release said detents in response to a release force exerted by a user.

27. The connector of claim 26, wherein the proximal end of the penetration tube is closed, said tube having a radial surface with at least one fluid opening for conveying fluid into the second housing.

28. The connector of claim 27, wherein the closed penetration tube proximal end has a blunt leading surface for engaging the second stopple.

29. The connector of claim 28, wherein the closed proximal end of the penetration tube defines a cylindrical shaped plug.

30. A disconnectable fluid connector for conveying fluid between a fluid container and a catheter, comprising:

first and second housings each defining an interior and having a proximal and a distal opening, said housings being adapted to fluidly connect to one another at their proximal openings;

one or more valves, said valve or valves biased in a normally closed position to block any fluid communication between the proximal and distal openings of said first housing;

attachment means to connect said first and second housings at their proximal openings and force said valve or valves into an open position to create a fluid connection pathway allowing fluid communication between the connected first and second housings;

said attachment means being detachable when a predetermined distal axial force is exerted to pull said housings away from one another, thereby operating to disconnect said first housing from said second housing and to return said valve or valves to a normally closed position; and

said attachment means being detachable upon the application of a distal axial force less than said predetermined distal axial force to said first and second housings by way of a mechanical detachment means operated by the application of force other than a distal axial force, thereby operating to disconnect said first housing from said second housing and to return said valve or valves to a normally closed position.

31. The disconnectable fluid connector of claim 30, wherein said valve or valves comprises:

two or more valves;

a first valve mounted in the first housing, said first valve biased in a normally closed position to block any fluid communication between the proximal and distal openings of said first housing; and

a second valve mounted in the second housing, said second valve biased in a normally closed position to block any fluid communication between the proximal and distal openings of said second housing.

32. The disconnectable fluid connector of claim 31, further comprising,

said first valve having a proximal surface that is substantially aligned with the first housing's proximal opening;

said second valve having a proximal surface that is substantially aligned with the second housing's proximal opening;

said proximal surfaces positioned so that as first housing is connected to second housing by way of said attachment means said proximal surfaces come into contact before said valves are forced into an open position to create a fluid connection pathway allowing fluid communication between the connected first and second housings; and

said contact between said proximal surfaces forming a seal around said fluid communication pathway.

33. The disconnectable fluid connector of claim 32, wherein once said first housing has been disconnected from said second housing, the proximal surfaces of said valves can be disinfected and the first and second housings sterilely reattached by said attachment means.

34. The disconnectable fluid connector of claim 32, wherein at least one of said proximal surfaces is concave.

35. The fluid connector of claim 1, in which the second housing is directly connected to a catheter suitable for insertion into a patient's body.